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through small layers of liquefied oxygen, air, and nitrogen. (See brief review in *Astrophysical Journal*, Vol. I, p. 88.) Under certain conditions of temperature, pressure, etc., the spectrum of liquid oxygen showed a line at $\lambda 5572$. "The wave-length of the auroral line is $\lambda 5571.6$; and the conditions of temperature and pressure in these experiments must have been somewhat similar to those under which the Aurora appears. This points, of course, to the probability of the auroral line being due to the oxygen of our atmosphere."

Still more recently, Professor RAMSAY and Dr. NORMAN COLLIE succeeded in liquefying a quantity of argon. It formed a colorless fluid, but two other products also resulted. These were a lighter gas which failed to liquefy, and a solid deposit which gathered on the sides of the tube.

The lighter gas was drawn off and its spectrum examined. In Professor RAMSAY's announcement to the Royal Academy, on June 16th, the spectrum of this gas, called by him *neon*, is described as containing a large number of strong lines in the red, orange, and yellow, and in the deep violet. Experiments to determine its density seemed to indicate that the gas had not been obtained in its pure form.

These two gases are undoubtedly new elements; but the third, obtained from the solid frozen out of the argon, may yet prove to be a new compound of known elements, rather than a new element. This substance, called *metargon* by its discoverers, has a density of 19.87, the density of argon being 19.94. Its spectrum showed many bands whose wave-lengths are closely coincident with those in the band spectrum of carbon and with three cyanogen bands, as was pointed out by Professor SCHUSTER (*Nature*, Vol. LVIII, p. 199).

The spectroscopic evidence is therefore strong that it is some carbon compound rather than a new element. Subsequently (*Nature*, Vol. LVIII, p. 245), Messrs. RAMSAY, TRAVERS, and BALY describe precautions taken, and chemical tests applied, to exclude the possibility of any carbon existing in this gas, and ask for a suspension of judgment pending further investigation.

R. G. AITKEN.

THE MINOR PLANET (334) *CHICAGO*.

This small planet was discovered, photographically, by Professor MAX WOLF, at Heidelberg, August 23, 1892. While

attending the astronomical conferences held in connection with the World's Fair, August, 1893, he gave it the name *Chicago*.

The planet *Chicago* is of more interest than many of the asteroids, by reason of the nearness of its orbit to that of *Jupiter*, and of the large perturbations which it experiences when it is in the vicinity of the latter planet. In 1894, the two planets were near together, their distance being only 1.25 astronomical units. At that time *Jupiter's* perturbing force amounted to $\frac{1}{108}$ th of the attractive force of the Sun.

The periodic times of the two planets are very nearly in the commensurable ratio of 2 to 3, the mean daily motion of *Jupiter* being $299''.12836$, and that of *Chicago*, $455''.998$. While *Jupiter* makes two revolutions about the Sun, *Chicago* makes slightly more than three. As a result, the consecutive returns of the two planets to those points in their orbits where they are nearest together fall at nearly the same places, allowing the perturbations to have an accumulative effect. These points, however, do not exactly coincide, but move slowly around the orbits, completing a revolution only after a long interval of time. This insures the existence of very sensible inequalities of long period and of considerable changes in the values of some of the elements of the orbit of *Chicago*. The perturbing action of *Jupiter* will cause the eccentricity of the orbit of *Chicago* to decrease until it becomes zero (*Astrophysical Journal*, December, 1897); this orbit will then be truly circular, and as the eccentricity passes on to negative values, the longitude of perihelion will change 180° .

These considerations make it desirable to obtain at each opposition a sufficient number of observations of the planet *Chicago* to form a secure normal place, thus affording the data necessary for the basis and control of the theoretical investigations relating to its orbit. With this object in view, I obtained observations of it on six nights in May and June of the present year with the 36-inch refractor, and on five of these nights observations were also made by Mr. CODDINGTON.

This planet is faint (12.1 magnitude), and at the time our observations were made it was passing through a region of the sky where faint stars of about its brightness are especially numerous. On this account, it would have been a matter of considerable difficulty to find the planet by examining the stars visually for motion, and the more so since it was nearly three-

quarters of a degree from its predicted place. This difficulty was removed by Mr. CODDINGTON, who first photographed the region with the Crocker telescope, giving an exposure of three hours. He identified the planet by means of its trail, and derived an approximate correction to the ephemeris. He next prepared charts of the faint stars shown on his photographic plates, and inserted on them the predicted places of the asteroid for the times at which we intended to observe it. This proved very successful. At the time of the first observation, I selected the planet at the first trial, and within five minutes from the time when the telescope was pointed to the proper field had it identified, by means of its motion. At the times of the other observations we found it with almost equal ease. W. J. HUSSEY.

LICK OBSERVATORY, September 13, 1898.

THE NEW MINOR PLANET, 1898 *DQ*.

The minor planet, 1898 *DQ*, discovered photographically by WITT at the Urania Observatory, Berlin, August 13th, promises to be of unusual interest. According to the preliminary elements of its orbit, computed by BERBERICH, its perihelion lies far within the orbit of *Mars*; and indeed so close does its path come to that of the Earth, that at the place of nearest approach they are separated by less than 15,000,000 miles. When nearest the Earth, the planet's equatorial horizontal parallax is about a minute of arc, exceeding that of any other known body whose position can be measured with the same degree of accuracy. On this account, it will be an excellent object by means of which to determine the solar parallax, and thence the mean distance of the Earth from the Sun. W. J. HUSSEY.

LICK OBSERVATORY, September 27, 1898.

DISCOVERY AND ORBIT OF COMET *h* 1898 (PERRINE).

This comet was discovered in the morning of September 13th. This is the eighth comet to be discovered this year, five being unexpected. The comet's position on the morning of discovery at 0^h 58^m 8^s G. M. T. of Sept. 13th, was α 9^h 35^m 49^s.27, δ + 31° 4' 31".0. The comet was then between the two constellations *Leo*, *Major* and *Minor*, and was moving east 6^m per day and south 30'. Its daily motion is rapidly increasing in both co-ordinates, and thus gaining on the Sun at such a rate that it will probably be lost in the dawn early in October. At the time of discovery, it had a